Moog Sub 37

Synthesizer

Moog's latest synth, the Sub 37, sees the company return to the form that made their reputation back in the 1970s.

GORDON REID

Once reborn from their Big Briar incarnation, Moog Music's first synth was the Minimoog Voyager Signature Edition, which immediately garnered a cult following. Released in the UK in 2003, it wasn't quite finished, but was quickly followed by numerous updates to operating system and hardware that sorted out its shortcomings. Hot on its heels came the Performer Edition and, in 2004, another

Photos: Richard Ecclestone

limited edition, the Anniversary model. Then, in 2006, Moog changed direction by releasing the Little Phatty, which cost less than half the price of its illustrious sibling. Of course, this affordability came at a price (if you see what I mean) that was paid not so much in its sound but, in large part, in its unusual parameter-access programming system. I wasn't a huge fan but, despite my reservations, I have to admit that others were. Next came the Voyager Old School, followed by the excellent Taurus 3 bass pedals, and then the Voyager XL which, prior to the launch of the Emerson Moog Modular earlier this year, was the reincarnated Moog's finest moment — a synth of such inherent sexiness that it's sometimes hard to stop admiring it and begin playing it.

In 2012, Moog released the Minitaur, a bass module that, sonically, sat somewhere between the Taurus 3 and the Little Phatty. Reviewing it in May of that year, I commented that "it seems obvious that the Minitaur would sing as a lead synth too", and the chaps at Moog must have agreed, because the next stage was the Sub Phatty, which took the character of the Minitaur and transplanted it into a diminutive keyboard synth. I rather liked this, but was unable to recommend it unequivocally because of its short keyboard and profusion of hidden functions, some of which could only be accessed using arcane combinations of key-presses or the associated software editor. So I suggested that a Sub Phatty with a wider keyboard and everything revealed on the control panel would be a fine instrument, especially if it sported additional performance capabilities such as aftertouch. Again, it seems that I wasn't the only one thinking along those lines, because this brings us to the present day and the Sub 37, which draws upon the technology of the Voyager, the Minitaur and the Sub Phatty, and seems to offer everything that I hoped it might. I wonder if it does?

The Technology

The Sub 37 is an analogue/digital hybrid with an analogue signal path controlled by digitally generated modulators and contour generators. Physically, it's based around a velocity- and pressure-sensitive three-octave keyboard and, with its steel chassis and wooden end-cheeks, plus a control panel that bristles with knobs and buttons, it looks and feels like a 'real' synth. A small screen suggests that there are still some parameters to be found in menus, but even a quick glance reveals that all its major facilities should fall immediately to hand.

The Oscillators & Mixer

Superficially, the dual oscillators on the Sub 37 are similar to those of the Sub Phatty. They share the same continuous spectrum of waveforms running from triangle to sawtooth to square to pulse waves, the same 16', 8', 4' and 2' footages, the same square-wave sub-oscillator one octave below Osc1, the same hard sync, and the same ±7 semitones detune of Osc2 with respect to Osc1. They also share the same Beat Frequency of up to ±3.5Hz (which provides a consistent detune rather than scaled detune across the whole frequency range) and the same KB Reset function that initialises the oscillators each time that you press a key so detuned notes are reproduced consistently. Less superficially, the Sub Phatty's underlying oscillator architecture — a Minitaur oscillator core followed by the Voyager's variable waveshaper — has been retained.

This is all good news; I have always felt that the Sub Phatty's oscillators were »

The Sub 37 Editor

The Sub 37 should have been shipped with a software editor, but the chaps at Moog are still working on it and, at the time of writing, there wasn't even an alpha version available for inspection. When it arrives, it will operate along the same lines as the Sub Phatty editor, and will come in both stand-alone and VST/AU/AAX versions. In addition to editing and managing patches, it should also provide automation when run as a DAW plug-in, and the Minitaur's excellent CV-mapping options (which allow you to control parameters other than the pitch, filter cutoff frequency and volume using voltages applied to the pitch, filter and volume CV inputs) are also promised.

Moog Sub 37 £1249

PROS

- Although reasonably small, this is a truly grown-up synthesizer.
- A proper control panel. Thank you!
- Velocity and aftertouch sensitivity. Thank you again!
- And, of course, its sound.

CONS

- With just three buttons to do so, navigating the menus can be a bit clunky.
- There are a couple of facilities and bugs to be tidied up.
- There are no analogue CV/Gate outputs.

SUMMARY

Some people are going to view the Sub 37 as a Sub Phatty with its Hidden Functions revealed on the control panel, but it's much, much more than that. I hope that I'm not easily impressed, especially by a monosynth, but I'm impressed. This is a good 'un.

» superior to those of its Little and Slim grandparents. But it's far from the whole story, because the Sub 37 also allows you to play its oscillators independently using the type of duophonic mode introduced on the ARP Odyssey in 1972. You can allocate Osc2 to the higher of the two notes played, to the lower, or disconnect it from the keyboard to produce a drone at a frequency determined by the Frequency knob, which now has an extended range of three octaves.

Turning next to the Glide section, there's the expected knob that controls the rate, and you can select the type of portamento you want on a patch-by-patch basis. The options are linear constant rate, linear constant time and exponential, the last of which gave some vintage synths a desirable character that is less common today than it should be. You can apply the portamento to Osc1 or Osc2 or both (which is another nice touch) and the glide can be gated (it stops when you release the key) and/or legato (meaning that it only occurs when both the start and destination keys are pressed contemporaneously). All in all, this is an impressive range of options.

The Mixer section has five inputs: Osc1, Osc2, the sub-oscillator, noise and the signal from the external signal input. As on previous Moog synths, oscillator levels clockwise of 12 o'clock or thereabouts »

Alternatives

This is a golden age for analogue monosynths. Recent releases have included innovative designs such as the **Arturia MiniBrute** and **MicroBrute**, recreations of classics such as the **Korg MS20**, and there's even a clone of the **ARP Odyssey** on the horizon. Elsewhere, you can find numerous digital and hybrid synths that offer much of the sound and feel of analogue synthesis. But is there anything that competes directly with the Sub 37? One obvious contender is the new **DSI Pro 2**, which has just arrived for review, looks beautiful, and seems to offer much that overlaps with the Moog. But, with its four oscillators, dual filters, on-board effects, enhanced analogue I/O, wider keyboard and four-voice paraphonic mode, is it a direct competitor or something more? I'll know more when I've had a chance to burrow into the Pro 2's innards, so watch this space.

The Side Panel

I was rather critical of the Sub Phatty's I/O panel because its black legends embossed on a black background made it impossible to tell which hole was which. This has now been rectified, and the Sub 37's sockets and their associated legends are now to be found on a brushed-aluminium panel that makes everything clear and easy to find.

For power, Moog have resisted the urge to go down the low-cost route, and the Sub 37 boasts a welcome IEC mains socket for an internal 100V-240V, 50/60Hz AC power supply. Alongside this lies the audio I/O, which comprises a single quarter-inch output plus a single quarter-inch input that allows you to mangle external audio signals. (A headphone socket is provided to the right of the control panel.) There are four analogue control inputs: 1V/Oct pitch and filter CVs, an amplifier CV and a +5V Gate, but no CV outputs, which some potential users will bemoan. Finally, there's the MIDI section, with MIDI In and Out on five-pin DIN sockets and USB. Happily, you don't need specific drivers for your computer to recognise the Sub 37. Just be aware that the USB carries MIDI only, not audio.

» will overdrive the filter's input, and this is also true of the pink noise generator, which can (intentionally) sound a touch grainy and distorted at high levels. But it's the last of these inputs that should grab your attention because, in the absence of a cable plugged into the Audio In socket, this acts as a feedback loop that routes the output from the mixer section back into its input. This concept is based upon a trick that was discovered on the Minimoog in the early 1970s, whereby players would plug a cable between one of the synth's outputs and its external signal input to obtain anything ranging from a mild thickening of the sound to the insane scream of tortured components. On the Sub 37, the most extreme feedback setting remains controlled, but in a DC Comics sort of way... the mild-mannered sound finds an unoccupied phone box, removes its spectacles, and turns into Superpatch, stopping speeding guitarists in their tracks and leaping over unwary rhythm sections at a single bound. Or maybe it's The Hulk. You get the picture.

The Filter, Contour Generators & Output Section

The Sub 37 has a single filter that Moog describes as a "classic 20Hz-20kHz Ladder Filter". Again, the similarities to the Sub Phatty are legion. All four cutoff slopes are retained (although you no longer need to remember arcane key presses to access them), and all four modes will self-oscillate when you set the resonance high enough. Keyboard tracking (from zero to 200 percent) is retained, and the cutoff frequency can be swept with positive and negative polarity by the dedicated contour generator. In addition, the Sub 37's Multidrive uses the same two distortion circuits as the Sub Phatty, one lying before the filter, the other after it. However, without the extra gain and distortion made possible by the Sub 37's feedback, the earlier synth's overdrive was tame by comparison.

Although the Sub 37's dual (filter/amplifier) contours are digitally generated, they're passed through analogue low-pass filters to ensure that the ensuing CVs are smooth and continuous. I discussed the pros and cons of this with Amos Gaynes, the Product Specialist at Moog Music, and he described them as "virtually analogue", explaining that the decay and release contours emulate a capacitor charge/discharge circuit. He then pointed out something that I had noticed, but not remarked upon: you can adjust the generators' parameters and hear the results while holding a note, which is not always the case with other hybrids or VAs.

For decades, ADSR contours have been accepted as the best compromise between simplicity and flexibility, but many sound designers prefer more complex shapes, and

The Sub 37's Knob Shift function transforms the four-stage envelope into a six-stage envelope.

I must admit to being a fan of the Sub 37's six-stage contours. If you want to approach the generators as conventional ADSRs, the standard eight knobs are where you expect them to be. But if you want to take things further, there's a button labelled Knob Shift that invokes a second function for each. These are Delay (a delay between pressing the key and the start of the Attack), Hold (holding the peak level between the Attack and Decay stages), Velocity Amount, and KB Track (which determines the amount by which the contours become quicker as you play higher up the keyboard). The manual tells you that the KB Track affects the Decay and Release stages only, but that's not correct; it also affects the Attack, which is vital for imitative sounds. I was delighted to find that you can determine whether the Attack phase of the contours is linear or exponential, and do so independently for each. This is a rare and highly desirable feature.

If this weren't enough, you'll find five additional on/off parameters that you can set independently for each contour generator. The first is legato/multi-triggering, while the second allows you to determine whether each retrigger (whether legato or not) resets the contour to zero (or not). Next comes Sync, which retriggers the contour when sync'ed to

MIDI, and the fourth is Loop, which loops the DAHDR stages, with the Sustain determining the break point between the D and R stages. This turns each generator into a five-stage LFO with a programmable waveshape and, since each can be used as a source in the modulation matrices, this suggests all sorts of interesting possibilities. Interestingly, the Delay function in the amplifier contour only works when it's looping, placing a pause between each cycle, but never between the key press and the first instance of the Attack phase. I'm not sure why Moog made this distinction, but I can't say that it worries me. Finally, you can latch the contour 'on' at its Sustain level.

I tested the durations of the contour stages, all of which are quoted as having a range of 1ms to 10s. At the fast end of the spectrum, I found them to be very snappy indeed. In fact, when I patched a simple AD click, it was so fast as to be almost inaudible. One unexpected consequence of this is that you can create AM and FM sounds using looping contour generators to modulate the self-oscillating VCF and the VCA. At the slow end of the spectrum, I found the Attack, Hold and Release stages to be around 10s as quoted, and the Decay to be closer to 20s. You might think that this precludes really slow, languorous sweeps on the Sub 37, but it doesn't. Patch the contour times as destinations in the modulation matrices, and you can program sweeps that will last for much of your next album. This is all good stuff.

The output panel is the final stage in the audio signal path. There wouldn't be much to say about this except that two of my criticisms of the Sub Phatty were that (firstly) there was no master audio on/off switch and (secondly) the master volume control was in series with the headphone volume knob so that, when the master was turned down, the headphones were silent. The first of these has been rectified and, while the second hasn't, it's less important as a consequence. What's more, you can set the volume of each patch individually, so you only need use the volume knob for level matching; your quiet patches will be quiet and your loud ones will be loud without you ever needing to touch the knob. Your live sound engineer will love you.

Modulation, Arpeggios & Sequences

If there's one area that might be less than intuitive to non-Moog aficionados, it's the Sub 37's Voyager-style dual modulation sections. Each contains an LFO that generates five »

MIDI

The Sub 37 offers extensive MIDI capabilities. These include all the basics such as choosing whether the five-pin DIN sockets, the USB sockets, or both, are used, which channels are used for MIDI In and MIDI Out, which types of data (if any) are filtered from the synth's output, and whether incoming data streams are merged with data generated within the synth itself and then echoed to the chosen output(s). I was pleased to find that changes to the control panel knobs and buttons can be transmitted as either MIDI CCs in 7-bit or 14-bit format, and that every parameter in a patch (there are about 150 of them!) can be transmitted and received as an NRPN, which means that performances can be automated. Additionally, this means that, if you have the right gear at the other end of your MIDI cable, you can use the Sub 37 as a powerful controller. SysEx is provided for dumping and recalling the current edit buffer, the current patch, all patches, or the whole of the synth.

» waveforms — triangle, square, saw, ramp and S&H — and ranges from either 0.1Hz to 100Hz or from 1Hz to 1kHz, which suggests the possibility of all manner of additional AM and FM sounds. Two buttons provide keyboard reset (which reinitialises the LFO cycle each time that you press a key) and synchronisation to the internal clock or MIDI Clock, and two knobs determine the amount by which the LFO is applied to the pitches of the oscillators (Osc1, Osc2 or both) and the filter cutoff frequency, with either positive or negative polarity in both cases. Underneath these lies a section that allows you to direct the modulation to a third destination: the waveshapes of Osc1, Osc2 or both, the noise level, the VCA level, or the rate of the other modulator. (You can even modulate Mod1 using Mod2, and Mod2 using Mod1, for all sorts of wibbly mayhem.) An associated knob determines the modulation depth, again with either polarity.

So far so simple, but the Sub 37 has yet deeper capabilities. Within each modulator, you can bypass the LFO and select one from a list of 10 additional modulation sources, and one from 83 possible destinations. You can then determine the amount by which the mod wheel, velocity, aftertouch and a fourth controller (currently fixed to MIDI CC#2 — breath control) affect the modulation depth. For the moment, the amounts of any active controllers are multiplicative so, for example, if the mod wheel amount is set to 100 percent but the wheel is fully toward you (ie. at zero) you won't be able to create modulation using (say) aftertouch, but an additive mode is scheduled for a future update.

In my review of the Sub Phatty I stated that, "I can imagine some potential users bemoaning the lack of an arpeggiator or step sequencer," so I'm pleased that the Sub 37 offers both. The arpeggiator offers the expected rate, tap tempo and sync options, with Up, Down, Up/Down, Note Order and Random modes, and a quick read of the manual reveals a handful of other tricks in the menus — gate lengths, clock divisions, how 'end notes' are handled in back/forth arpeggios, and so on — all of which add to the flexibility of the system. I particularly like the Invert button, which plays each note across all the selected octaves before playing the next, and creates a whole new set of patterns.

The arpeggiator's Pattern knob also provides access to the 64-step sequencer, which allows you to program sequences on a per-patch basis. It's wonderfully simple to use. At the most basic level, you just turn the knob to Rec, play the notes and then turn the knob to Seq to replay them at any wanted pitch by pressing the appropriate note on the keyboard. Going further, you can add rests and ties, the latter of which will either extend a note or create a legato transition from one to the next. This can be particularly effective if the patch includes legato portamento because some note transitions can exhibit immediate changes of pitch, while others slide from one note to the next. You can even create sequences in Duo mode. If you play one note on a step, both oscillators are allocated to this; if you play two notes, the oscillators are allocated as determined by the buttons in the oscillator section. With portamento allocated to Osc1, Osc2 or both (as you choose) the results can be very musical.

Of course, you can synchronise everything in this section to the Sub 37's internal clock or to MIDI Clock. So, if you want to run arpeggios or sequences in which the notes, the modulators and the contours are synchronised to one another, perhaps with different clock divisions, you can do so. If you would prefer some aspects to be sync'ed while others are free-running, that's no problem either.

Abridged specification

Type of instrument	Mono/duophonic hybrid subtractive synthesizer.
Keyboard	37 semi-weighted keys, velocity- and aftertouch-sensitive.
Sound sources	Two oscillators, one square-wave sub-oscillator, one noise generator, one external/feedback input.
Filter	Low-pass, resonant, 6-, 12-, 18- and 24dB/oct, with overdrive.
Contour generators	Two DAHDSR with sync'able looping, reset, latch and sync.
Number of modulators	Two.
Modulation sources	Sync'able 0.1Hz to 1kHz LFO (triangle, square, sawtooth, ramp, S&H) plus 10 programmable sources.
Modulation destinations	Osc1 & Osc2 pitch, Osc1 & Osc2 waveshape, noise level, filter cutoff frequency, VCA level, rate of other LFO, plus 83 programmable destinations.
Arpeggiator	Up/Down/Up-Down/Ordered/Random, sync'able.
Sequencer	64-step, programmable per patch, sync'able.
Screen	Backlit 128 x 64 pixel LCD.
Audio output	Quarter-inch mono out, TRS mono headphone output.
CV & Gate inputs	Filter CV, pitch CV, volume CV, Gate.
MIDI I/O	In & Out over five-pin DIN and USB.
Memories	256.
Weight	10kg.

In Use

There are many additional bits and bobs in the Sub 37 worthy of special mention (as well as many others that you'll have to discover for yourself). Of particular interest to the widdly-widdly brigade is that you can determine the note priority on either a global basis, or (woo-hoo!) on a per-patch basis. I like synths that allow me to select between high-, low- and last-note priorities, and to be able to choose this and simultaneously select either single or multi-triggering on a per-patch basis is a treat. Add the Sub 37's duophonic mode into the equation, and my cake is well and truly iced. Back in the 1980s, my band played a track called 'Tabasco' that contained a synth line of such fiendish speed and complexity that I couldn't lift my fingers quickly enough to make it sound smooth in both directions. My ARP Odyssey was the only synth on which I could play it convincingly because — being duophonic — it produced each new note (in either direction) at the right moment, even if the previous one remained depressed for a fraction of a second. I recreated this sound and setup on the Sub 37 and it played beautifully.

None of this would be worth a hoot if the Sub 37 was a pain to program and didn't sound good, but, once you've gotten your head around the modulation sections, everything is straightforward, there are no hidden functions to get in the way of your creativity, and it sounds superb. When you »

The Sub 37's front panel certainly seems a bit more extensive than that of its Sub Phatty forebear.

first get your hands on one, hold the INIT button to initialise the patch to a simple beep. Now turn the Osc2 and sub-oscillator levels in the mixer to around 12 o'clock, add a smidgen of detune using the Beat Frequency knob, and drop the pitch by an octave. Now play. If that isn't fat enough for you (and it would already need a hoist to get out of bed) dial in as much feedback and Multidrive as you want and play the result with a smidgen of reverb to smooth out the beating. It has been a long time since I set up such a simple patch and exclaimed, "Holy sh**!". You can even set the feedback and Multidrive amounts to be modulation destinations, placing them under the control of things such as velocity, the mod wheel and aftertouch. You'll like this a lot.

Of course, not everything has to have the sonic footprint of Godzilla and, like many Moogs before it, the Sub 37 can produce some lovely, sweet patches. Play a single oscillator with a little vibrato and PWM and experiment with the various filter cutoff slopes and you'll find that you can emulate the characters of many vintage synths from early Korgs and Rolands to ARPs and, of course, Moogs. As on the Sub Phatty, there's something rather appealing about this filter in its 6dB, 12dB and 18dB-per-octave modes, and there are some excellent sounds to be discovered here. And as for bread-and-butter sounds such as solo brass and flutes, I obtained these more quickly and more intuitively on the Sub 37 than on any other new synth that I've used recently. Happily, with 256 memories now provided (the Sub Phatty offered just 16) there's room to store all of these and more.

I should also mention that, if you have the cash and the inclination, you can connect multiple Sub 37s to create a monster polysynth. I don't know whether anyone will ever do so, nor whether it would be wise. Philosophically, it would be equivalent to an Oberheim 4 or 8 Voice, especially if you used SysEx as a substitute for a physical programmer for all the synths in the setup. But the Sub 37 isn't an SEM, and I suspect that, without taking great care to keep the sound in check, the resulting instrument could be too 'big' to mix.

Finally, I have to find something to criticise and, other than a few slightly wobbly pots, I've only found one issue. If you play a sound based on AD contours with a high value of contour tracking, there comes a point at which the contours go from being quick on one note to being virtually instantaneous on the one above it, meaning that higher notes turn into quiet clicks and, in any musical sense, disappear. Moog's engineers are already looking into this to verify my findings, and it's possible that they will have fixed it by the time that you read this. And that's it! That's my criticism. Either I'm losing my touch, or the Sub 37 really is a damn fine synthesizer. Of course, a 44- or even a 49-note keyboard would make it even finer, but that's a discussion for another day.

Conclusions

Moog's President, Mike Adams, once described the Sub Phatty as "the grittiest Moog synth ever". If he wasn't wrong then, he is now. The Sub 37 can snarl like no other Moog, but it's equally adept at gentler sounds and classic patches. Does it eclipse the Voyager? I'm not sure. On one hand, comparing it to a no-compromise triple-oscillator, dual-filter synth offering extensive analogue I/O might be inappropriate. On the other, it's more immediate than the Voyager, and you can now obtain the Moog sound from a powerful 'hands on' synth without the added expense of facilities that you may never use. So, finally, we come to the question of price. There are some excellent low-cost synthesizers out there and, with a list price of £1249, the Sub 37 isn't for those on a tight budget. Nevertheless, I recommend that you try it. I still love my Minimoog, and the Voyager XL remains in many ways a dream machine but, were I to take a Moog synth on stage tomorrow, the combination of the Sub 37's diminutive size, its almost all-encompassing note priority and triggering options, its duophony, its performance facilities, its ability to become stable just seconds after switching on, plus the sheer quality of its sound, make it almost irresistible. I have a feeling that Moog Music really listened to their customers when designing this one. Big tick. Gold star. ■■■

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